

A PRELIMINARY REPORT ON A POSSIBLE STROMATOLITE FIND FROM THE ELEPHANT MORaine, ANTARTICA: A POTENTIAL DIRECTIONAL INDICATOR FOR ICE MOVEMENT: P.P. Sipiera\* and C.A. Landis, Department of Geology, University of Otago, New Zealand.

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During the 1983-84 Antarctic Search for Meteorites field season, numerous specimens of a shiny black rock were collected from among the glacial debris at the Elephant Moraine. From a distance these black rocks gave the appearance of meteorites, but upon closer inspection, distinct layering and radial crystal growth patterns became clearly visible. In hand specimen these rocks exhibit a distinctive jet-black coloration, along with a "desert-glaze" that is the probable result of a sand-blasting effect by the wind-blown granular snow. Most specimens have the layered appearance, but a few resemble rounded "clumps" of material attached to a clastic sedimentary baserock (see Figure 1). Later laboratory investigations showed that these unusual specimens are primarily composed of carbonate minerals.

Petrographically, microscopic examination of twelve randomly collected specimens revealed a variety in the habits of the carbonates, but the overall trend tends to be one of radiating acicular crystals that have the appearance of a psuedo-cellular structure reminiscent of stromatolites. A mean mineralogical composition of 99.53%  $\text{CaCO}_3$ , .10%  $\text{FeCO}_3$ , .10%  $\text{MgCO}_3$ , and .03%  $\text{MnCO}_3$  was obtained from twelve electron microprobe spot analyses of the specimens shown in Figure 1. The coloration apparent in the zonation in Figure 2 is primarily attributed to the variability of the  $\text{FeCO}_3$  and  $\text{MnCO}_3$  content between core and rim.

On the question of a possible stromatolite nature to these rocks, it is open to debate and cannot be resolved at this time without further study. Comparisons have been made to various stromatolites from around the world, and some structural similarities exist, but are not conclusive. If these rocks are indeed representative of stromatolites, then they must be altered forms of the original material. In Walter, 1976, examples of similar materials of non-organic nature are cited. One possibility is a form of calcrete, and as reviewed by Read in Walter, 1976, it is easily confused with cryptalgal structures. It is then possible that the Elephant Moraine rocks may represent a mixture of algal material interlayered with either calcrete or cryptalgal sedimentation. A second possibility has been pointed out by Faure (pers. comm., 1985) in his suggestion that these carbonate rocks may be of hydrothermal origin. This is based on their  $^{87}\text{Sr}/^{86}\text{Sr}$  ratios which exceed those of marine strontium, and the fact that the calcite he examined is associated with opaline chert.

Given the fact that these black carbonate rocks were found among glacial debris that was probably transported over a great distance, the determination of their source area could aid in the comprehensive understanding of ice movement in the area. A preliminary search of the literature has not found any other Antarctic location where similar material has been collected. One possible site was reported by Burgess and Lammerink, 1979, in which they briefly discussed black stromatolites in the Shackleton Limestone from the Byrd Glacier area. Comparison with this material in the collection at Victoria University in New Zealand proved negative, but does not rule it out since unclassified material remains to be studied. It is hoped that future research will be able to specifically identify this possible stromatolite material and that a source locality will be found. At present, we can only hope that this preliminary report will provide an awareness of this rather unique material.

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Burgess, C.J. and W. Lammerink, Geology of the Shackleton Limestone (Cambrian) in the Byrd Glacier Area, New Zealand Antarctic Record, vol. 2, pp. 12-16, 1979.

Read, J.F., Calcretes and their distinction from stromatolites, in Developments in Sedimentology 20, Stromatolites, edited by M. R. Walter, Elsevier, 1976.

Walter, M.R., Editor, Developments in sedimentology 20, Stromatolites, Elsevier, 1976.

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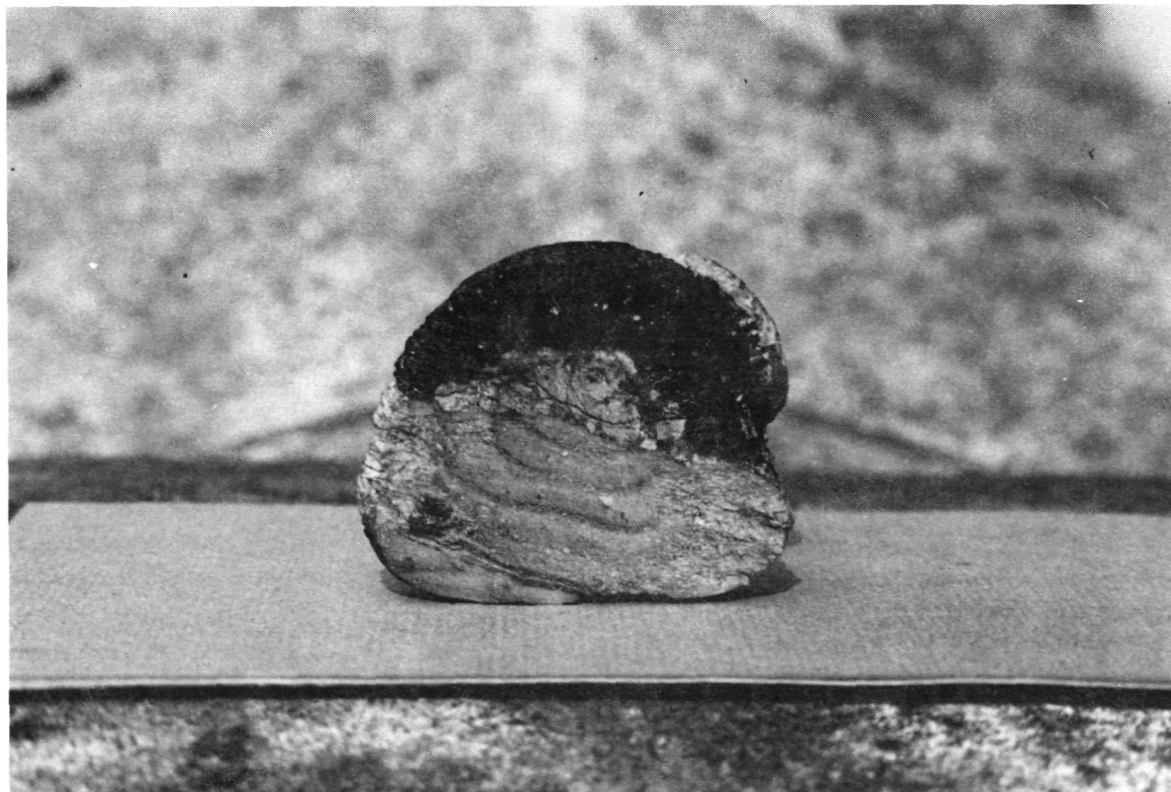


Figure 1. Example of the black calcite in association with a shale. Note the acicular habit exhibited by the calcite. (Specimen is approximately actual size)

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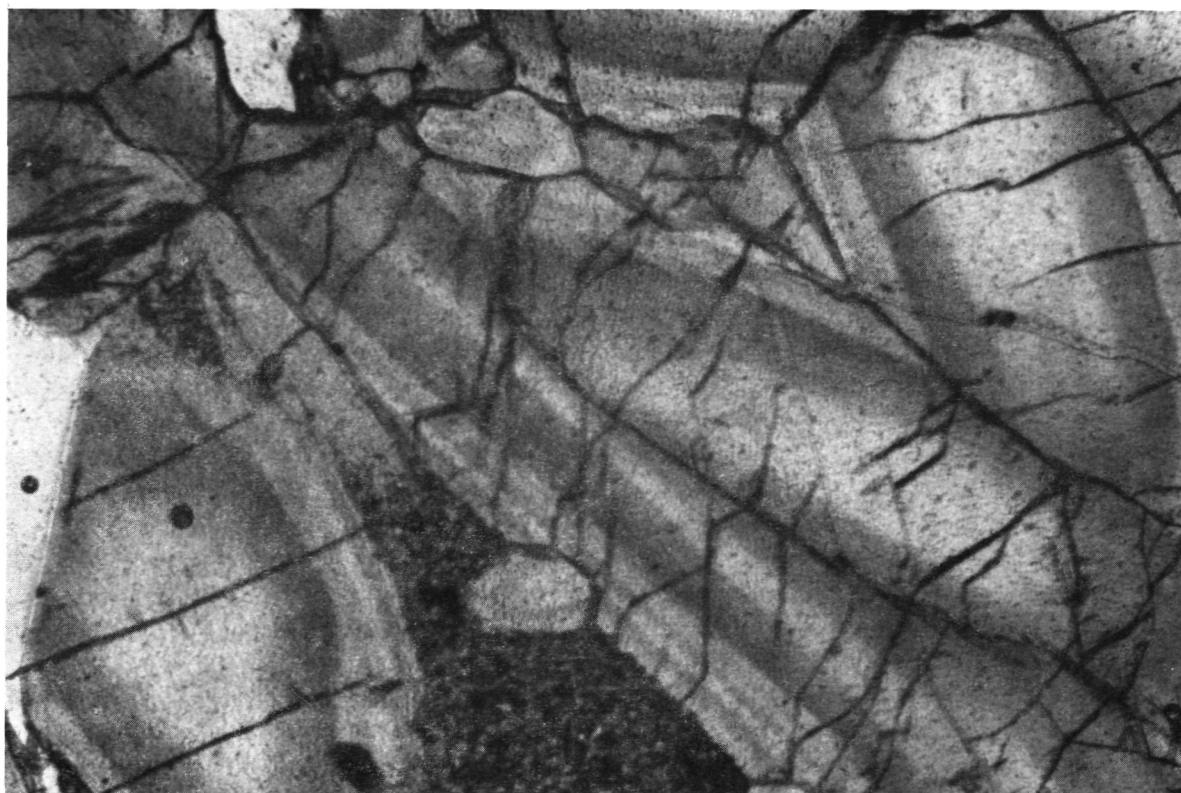


Figure 2. Photomicrograph of the psuedo-cellular structure in the possible stromatolites found at the Elephant Moraine. (10x magnification)